DOT specification	106A500–X	106A800–X	110A500–W	110A600–W	110A800–W	110A1000–W
Minimum required bursting pressure, psig	(1)	(1)	1250	1500	2000	2500
Minimum thickness shell, inches	13/32	11/16	11/32	3/8	15/32	19/32
Test pressure, psig (see § 179.300–16)	500	800	500	600	800	1000
Safety relief devices, psig (see § 179.300–15)	.....	.....	.....	.....	.....	.....
Start-to-discharge, or burst maximum, p.s.i.	375	600	375	450	600	700
Vapor-tight, minimum psig	300	480	300	360	480	650

[1] None specified.

(b) [Reserved]

[29 FR 18995, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 179–10, 36 FR 21355, Nov. 6, 1971; Amdt. 179–40, 52 FR 13049, Apr. 20, 1987; 65 FR 58632, Sept. 29, 2000; 66 FR 45390, Aug. 28, 2001]

§ 179.302 [Reserved]

Subpart F—Specification for Cryogenic Liquid Tank Car Tanks and Seamless Steel Tanks (Classes DOT–113 and 107A)

SOURCE: Sections 179.400 through 179.401–1 appear at 48 FR 27708, June 16, 1983 (Amdt. 179–32), unless otherwise noted.

Sections 179.500 through 179.500–18 appear at 29 FR 18995, Dec. 29, 1964, unless otherwise noted. Redesignated at 32 FR 5606, Apr. 5, 1967.

§ 179.400 General specification applicable to cryogenic liquid tank car tanks.

§ 179.400–1 General.

A tank built to this specification must comply with §§ 179.400 and 179.401.

§ 179.400–3 Type.

(a) A tank built to this specification must—

(1) Consist of an inner tank of circular cross section supported essentially concentric within an outer jacket of circular cross section, with the out of roundness of both the inner tank and outer jacket limited in accordance with Section VIII, Division I, Paragraph UG–80 of the ASME Code;

(2) Have the annular space evacuated after filling the annular space with an approved insulating material;

(3) Have the inner tank heads designed concave to pressure; and

(4) Have the outer jacket heads designed convex to pressure.

(b) The tank must be equipped with piping systems for vapor venting and transfer of lading, and with pressure relief devices, controls, gages and valves, as prescribed herein.

§ 179.400–4 Insulation system and performance standard.

(a) For the purposes of this specification—

(1) *Standard Heat Transfer Rate* (SHTR), expressed in Btu/day/lb of water capacity, means the rate of heat transfer used for determining the satisfactory performance of the insulation system of a cryogenic tank car tank in cryogenic liquid service (see § 179.401–1 table).

(2) *Test cryogenic liquid* means the cryogenic liquid, which may be different from the lading intended to be shipped in the tank, being used during the performance tests of the insulation system.

(3) *Normal evaporation rate* (NER), expressed in lbs. (of the cryogenic liquid)/day, means the rate of evaporation, determined by test of a test cryogenic liquid in a tank maintained at a pressure of approximately one atmosphere, absolute. This determination of the NER is the NER test.

(4) *Stabilization period* means the elapsed time after a tank car tank is filled with the test cryogenic liquid until the NER has stabilized, or 24 hours has passed, whichever is greater.

(5) *Calculated heat transfer rate.* The calculated heat transfer rate (CHTR) is determined by the use of test data obtained during the NER test in the formula:

$$q = [N(\Delta h)(90-t_l)] / [V(8.32828)(t_s-t_f)]$$

Where:

q = CHTR, in Btu/day/lb., of water capacity;
N = NER, determined by NER test, in lbs./day;
Δh = latent heat of vaporization of the test cryogenic liquid at the NER test pressure of approximately one atmosphere, absolute, in Btu/lb.;
90 = ambient temperature at 90 °F.;
V = gross water volume at 60 °F. of the inner tank, in gallons;
t_l = equilibrium temperature of intended lading at maximum shipping pressure, in °F.;
8.32828 = constant for converting gallons of water at 60 °F. to lbs. of water at 60 °F., in lbs./gallon;
t_s = average temperature of outer jacket, determined by averaging jacket temperatures at various locations on the jacket at regular intervals during the NER test, in °F.;
t_f = equilibrium temperature of the test cryogenic liquid at the NER test pressure of approximately, one atmosphere, absolute, in °F.

(b) DOT–113A60W tank cars must—

(1) Be filled with hydrogen, cryogenic liquid to the maximum permitted fill density specified in §173.319(d)(2) table of this subchapter prior to performing the NER test; and

(2) Have a CHTR equal to or less than the SHTR specified in §179.401–1 table for a DOT–113A60W tank car.

(c) DOT–113C120W tank cars must—

(1) Be filled with ethylene, cryogenic liquid to the maximum permitted fill density specified in §173.319(d)(2) table of this subchapter prior to performing the NER test, or be filled with nitrogen, cryogenic liquid to 90 percent of the volumetric capacity of the inner tank prior to performing the NER test; and

(2) Have a CHTR equal to or less than 75 percent of the SHTR specified in §179.401–1 table for a DOT–113C120W tank car.

(d) Insulating materials must be approved.

(e) If the insulation consists of a powder having a tendency to settle, the entire top of the cylindrical portion of the inner tank must be insulated with a layer of glass fiber insulation at least one-inch nominal thickness, or equivalent, suitably held in position and covering an area extending 25 degrees to each side of the top center line of the inner tank.

(f) The outer jacket must be provided with fittings to permit effective evacuation of the annular space between the outer jacket and the inner tank.

(g) A device to measure the absolute pressure in the annular space must be provided. The device must be portable with an easily accessible connection or permanently positioned where it is readily visible to the operator.

[Amdt. 179–32, 48 FR 27708, June 16, 1983, as amended at 49 FR 24318, June 12, 1984; 66 FR 45186, Aug. 28, 2001]

§179.400–5 Materials.

(a) Stainless steel of ASTM A 240/A 240M (incorporated by reference; *see* §171.7 of this subchapter), Type 304 or 304L must be used for the inner tank and its appurtenances, as specified in AAR Specifications for Tank Cars, appendix M, and must be—

(1) In the annealed condition prior to fabrication, forming and fusion welding;

(2) Suitable for use at the temperature of the lading; and

(3) Compatible with the lading.

(b) Any steel casting, steel forging, steel structural shape or carbon steel plate used to fabricate the outer jacket or heads must be as specified in AAR Specifications for Tank Cars, appendix M.

(c) *Impact tests* must be—

(1) Conducted in accordance with AAR Specifications for Tank Cars, appendix W, W9.01;

(2) Performed on longitudinal specimens of the material;

(3) Conducted at the tank design service temperature or colder; and

(4) Performed on test plate welds and materials used for inner tanks and appurtenances and which will be subjected to cryogenic temperatures.

(d) Impact test values must be equal to or greater than those specified in AAR Specifications for Tank Cars, appendix W. The report of impact tests must include the test values and lateral expansion data.

[Amdt. 179–32, 48 FR 27708, June 16, 1983, as amended at 67 FR 51660, Aug. 8, 2002]

§179.400–6 Bursting and buckling pressure.

(a) [Reserved]

(b) The outer jacket of the required evacuated insulation system must be designed in accordance with §179.400–